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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/040,184 | 01/04/2002 | Hiroyuki Sakamoto | 10059-405US (P25305-01) | 9287 |

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| EXAMINER | |
|---|---|
| RUTHKOSKY, MARK | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1745 | |

DATE MAILED: 12/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application N . | Applicant(s) | |
|---|---|---|---|
| | 10/040,184 | SAKAMOTO ET AL. | |
| | Examiner | Art Unit | |
| | Mark Ruthkosky | 1745 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *3/25/2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

## DETAILED ACTION

### *Priority*

The application is a continuation of PCT/JP01/04242 files 5/21/2001.

### *Information Disclosure Statement*

The information disclosure statement filed 1/4/2002 has been placed in the application file, and the information referred to therein has been considered as to the merits.

### *Drawings*

The drawings filed on 1/4/2002 have been approved.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 7, and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikoma et al. (US 5,700,596), and further in view of Kenichi (JP 07-094,182.)

The instant claims are to a positive electrode active material for an alkaline storage battery comprising a nickel hydroxide powder solid solution containing magnesium in 2-7 mole percent of all metallic elements contained in the nickel hydroxide. Nickel hydroxide has a tap

density of 1.9 g/cm3 or more and a sulfate ion content of 0.5 weight percent or less. The nickel hydroxide material further has a half-width of a (101) peak neat 2θ = 37-40 degree in a powder x-ray diffraction pattern by CuK α- radiation of 0.7-1.2 degrees.

Ikoma et al. (US 5,700,596) teaches a positive electrode active material for an alkaline storage battery comprising a nickel hydroxide powder solid solution containing magnesium in 2-7 wt. percent in the nickel hydroxide (about 3.9-27 mole percent based on $Ni(OH)_2$ and Mg, see claims 1-5 examples 7 and 10.) Nickel hydroxide has a tap density of 1.9 $g/cm^3$ or more. The mixture does not disclose a sulfate ion content for a magnesium doped nickel hydroxide. Mixtures of other elements, including cobalt and manganese, are noted. The active material is mixed with cobalt powders and cobalt hydroxide to form a positive electrode (col. 11, lines 35-65.) The reference is silent to X-ray diffraction measurements of the material.

Kenichi (JP 07-094,182) teaches a nickel hydroxide material further has a half-width of a (101) peak neat 2θ = 37-40 degree in a powder x-ray diffraction pattern by CuK α- radiation in the range of 0.7-1.2 degrees and with a ratio of $A_{001}$ to $B_{101}$ such that A/B is greater than 1.1. It would be obvious to one of ordinary skill in the art at the time the invention was made to use a nickel hydroxide material with these crystal features in the alkaline battery of Ikoma et al. as the material enhances active material utilization at high temperature and increases discharge capacity in alkaline batteries as taught by Kenichi. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

The references teach the use of an alkaline electrolyte without specifically mentioning sodium hydroxide. Sodium hydroxide is well described in the art to transfer ions in an alkaline battery. It would be obvious to one of ordinary skill in the art at the time the invention was made

to incorporate a 1-5 M electrolyte of sodium hydroxide into an alkaline battery as an electrolyte as this common electrolyte is well known in the art to transfer ions in an alkaline battery. One of ordinary skill in the art would have the motivation to choose sodium hydroxide as the electrolyte material as the sodium ion is sufficiently small to transfer charge and the hydroxide group is an alkaline material.

Claims 1-5, 7, and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikoma et al. (US 5,700,596), in view of Kenichi (JP 07-094,182) and further in view of Sei et al (JP 11-238,509.)

Ikoma et al. (US 5,700,596) teaches a positive electrode active material for an alkaline storage battery comprising a nickel hydroxide powder solid solution containing magnesium in 2-7 wt. percent in the nickel hydroxide (about 3.9-27 mole percent based on $Ni(OH)_2$ and Mg, see claims 1-5 examples 7 and 10.) Nickel hydroxide has a tap density of 1.9 $g/cm^3$ or more. The mixture does not disclose a sulfate ion content for a magnesium doped nickel hydroxide. Mixtures of other elements, including cobalt and manganese, are noted. The active material is mixed with cobalt powders and cobalt hydroxide to form a positive electrode (col. 11, lines 35-65.) The reference is silent to X-ray diffraction measurements of the material.

Kenichi (JP 07-094,182) teaches a nickel hydroxide material further has a half-width of a (101) peak neat $2\theta$ = 37-40 degree in a powder x-ray diffraction pattern by CuK $\alpha$- radiation in the range of 0.7-1.2 degrees and with a ratio of $A_{001}$ to $B_{101}$ such that A/B is greater than 1.1. It would be obvious to one of ordinary skill in the art at the time the invention was made to use a nickel hydroxide material with these crystal features in the alkaline battery of Ikoma et al. as the

material enhances active material utilization at high temperature and increases discharge capacity in alkaline batteries as taught by Kenichi. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

As the mixture does not disclose a sulfate ion content for a magnesium doped nickel hydroxide, it is considered to be zero, however, the prior art teaches that lowering the sulfate radical in a nickel electrode will improve capacity and prolong battery life. Sei et al. teaches a nickel oxide active material that contains an element such as Mg, Co, and Zn dissolved as a solid. The amount of the sulfuric acid radical (sulfate) is set to be less than 0.4 wt. percent. It would be obvious to one of ordinary skill in the art at the time the invention was made to alter the amount of sulfate to be less than 0.4 wt. percent in order to improve capacity and prolong battery life as taught by Sei et al. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

The references teach the use of an alkaline electrolyte without specifically mentioning sodium hydroxide. Sodium hydroxide is well described in the art to transfer ions in an alkaline battery. It would be obvious to one of ordinary skill in the art at the time the invention was made to incorporate a 1-5 M electrolyte of sodium hydroxide into an alkaline battery as an electrolyte as this common electrolyte is well known in the art to transfer ions in an alkaline battery. One of ordinary skill in the art would have the motivation to choose sodium hydroxide as the electrolyte material as the sodium ion is sufficiently small to transfer charge and the hydroxide group is an alkaline material.

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikoma et al. (US 5,700,596), in view of Kenichi (JP 07-094,182) and Sei et al (JP 11-238,509,) as applied above and further in view of Futoshi et al. (JP 11-149,924.)

The teachings of Ikoma et al. (US 5,700,596), Kenichi (JP 07-094,182) and Sei et al (JP 11-238,509) have been presented. With regard to claim 5, the reference teaches mixing the active material with cobalt hydroxide, which is an oxide of cobalt, however, if oxide is amended to be considered different than hydroxide, the rejection of claim 5 as being obvious over this combination of teachings is noted. The references do not teach the average valence number of cobalt in the cobalt oxide material to be larger than 3.

Futoshi et al. (JP 11-149,924), however, teaches an alkaline storage battery with improved energy density and cycle life wherein a nickel hydroxide solid particle is coated with a layer of cobalt oxide materials having a valence of +3 or higher to form a positive electrode active material. Further, the nickel hydroxide material has a has a half-width of a (101) peak neat $2\theta$ = 37-40 degree in a powder x-ray diffraction pattern by CuK $\alpha$- radiation in the range of 0.7-1.2 degrees and with a ratio of $A_{001}$ to $B_{101}$ such that A/B is greater than 1.1. It would be obvious to one of ordinary skill in the art at the time the invention was made to incorporate a nickel hydroxide solid particle is coated with a layer of cobalt oxide materials having a valence of +3 or higher to form a positive electrode active material in the nickel hydroxide electrodes of Ikoma et al. (US 5,700,596) as a coating layer of cobalt oxide material is shown to improve energy density and cycle life in the battery. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikoma et al. (US 5,700,596), in view of Kenichi (JP 07-094,182) and Sei et al (JP 11-238,509,) as applied above and further in view of Mitsunori et al. (JP 11-219,703.)

The teachings of Ikoma et al. (US 5,700,596), Kenichi (JP 07-094,182) and Sei et al (JP 11-238,509) have been presented. The references do not teach adding an oxide powder material of Y, Yb, Lu, Ti or Ca to the mix in 0.5-3 parts by weight to the active material. Mitsunori et al. (JP 11-219,703), however, teaches an alkaline storage battery with high use coefficient wherein a nickel hydroxide/magnesium solid solution is mixed with 0.5-5% of an yttrium oxide material (paragraphs 10, 17 and 50) to form a positive electrode. It would be obvious to one of ordinary skill in the art at the time the invention was made to add yttrium oxide to a nickel hydroxide-magnesium solid solution in the electrode of the prior art as the addition of this material is shown to produce a high utilization factor over a long period time from the early stages or the charge/discharge cycle and raises the capacity of the alkaline battery (paragraphs 6-12.) The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

***Examiner Correspondence***

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1193. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 703-305-0587. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:00.) If attempts to reach

the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 703-308-2383. The fax phone number for the organization where this application is assigned is 703-872-9306.

Mark Ruthkosky
Primary Patent Examiner
Art Unit 1745